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ABSTRACT

A study was conducted to establish a process for evaluating the difficulty of different handwritten letter forms. A criterion for calculating difficulty scores was delineated and four sets of letter forms were evaluated: manuscript, cursive, italic, and D'Nealian. Using the criterion, small letters were given a score of difficulty, the sum of which determined the difficulty of a style of handwriting. Maturation and move scores were calculated to determine the hand movement difficulty; beginning and estimation scores were calculated to determine the visual memory difficulty; and retrace and touch scores were calculated to determine the control of movement difficulty. The results indicated that cursive had high maturation and hand movement difficulty scores, indicating that cursive was the most difficult style to write and that it may not be a suitable style for beginning writers. The high visual memory score of manuscript suggests that students with poor visual memory would find it difficult to use. D'Nealian, although not as difficult as cursive, was slightly more difficult than manuscript. The scores for italic writing indicated that it was the least difficult to write, and offers the best alternative to manuscript with a transition to cursive. The change from italic print to an italic cursive writing is the natural joining of the same letter forms as speed increases. (HTH)

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EVALUATING THE DIFFICULTY OF CURSIVE, MANUSCRIPT, ITALIC AND D'NEALIAN HANDWRITING

Betty Duvall

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EVALUATING THE DIFFICULTY OF CURSIVE, MANUSCRIPT, ITALIC AND D'NEALIAN HANDWRITING

Dr. Betty Duvall

Over the past several decades one of the pervasive problems in elementary education has been what style of handwriting to teach. Currently in the United States, by general classification, four styles are being taught--manuscript, cursive, italic, and D'Nealian.

Educators attempting to select a style for handwriting instruction, based on research evidence, will find conflicting reports. Turner (1930) and Freeman (1936) found evidence to suggest that manuscript was more legible than cursive. Templin (1960) and Groff (1961), using adult populations, found that a feeling for the quality and legibility of one style of writing and a preference for its use were related to the sex of an individual. Studies by DiSpigno (1978), Duvall (1984), Lehman (1976), and Thomson (1954) claimed italic to be superior in both speed and legibility. Studies by Freeman (1936), Hildreth (1945), Reeder (1930), Turner (1930), and Washburn and Morphett (1937) found little evidence to support the speed-superiority of cursive over manuscript.

Handwriting research has attempted to establish which handwriting style is the most legible and the fastest to write. This study has established a process for evaluating the difficulty of letter forms and criteria for calculating difficulty scores. Many variables affect writing ability. The procedure used in this study eliminates all variables except the formation of

the letters.

A description of the historical development of handwriting styles is provided here. In this description, the author will focus on cursive, manuscript, italic, and D'Nealian. These styles are currently being taught in the United States.

Cursive Handwriting Style

The standardization of teaching handwriting probably began with the publication of Business Penmanship in 1848 when Platt Roger Spencer, a writing master, began to mass produce materials for instruction. The quill had been replaced by the pointed steel nib as the standard tool for handwriting between 1825 and 1830. Shading could be achieved by pressing on the steel nib to widen the point and increase the flow of ink. The regular system of shading, used in writing the then popular roundhand style with a quill, was arbitrarily dropped by Spencer.

Spencer managed to create a major marketing organization and established the Spencerian Colleges of Penmanship which succeeded across the country. The highly ornamental cursive longhand style was appealing to elementary schools and commercial businesses for over thirty-five years (Lehman, 1976).

The cursive style longhand used by Spencer can be credited to the wide use of copperplate engraving, the only known means of reproducing copybooks for school use at that time (Hildreth, 1960; Wise, 1924). The influence of engraving on roundhand, the style from which copperplate engraving took its form, led to the joining of letters, to the elaboration of capitals, and

to the increase in slant (Wise, 1924).

Later competitors of the Spencerian monopoly were G. A. Gaskell, who published his manual around 1880, followed by Charles Paxton Zaner in 1894 and Austin Palmer in 1910. Zaner and Palmer dropped the shading and introduced the use of uniform thin lines in writing (Lehman, 1976).

Readily available handwriting manuals and the driving momentum of the Industrial Revolution brought about standardized business operations, including handwriting used in transactions and record keeping. It was the commercial schools that were largely responsible for the promotion of writing, spurred by the need for record keeping at the onset of the Industrial Revolution. "From these schools there came a number of courses for the teaching of writing to be used in public schools. The criticism which may be made about many of these courses is that their authors lacked direct contact with child-problems and so failed to adapt the work to the elementary stage of development" (Dougherty, 1917, p. 283).

Lehman (1976) stated:

> The competing publishers of the late 19th century relied on two facts to sell their versions of handwriting materials:
>
> 1. their own expertise in the making of the difficult letter models. The experts were capable of astounding demonstrations of penwork and built their sales with their demonstrations.
> 2. elementary schools were just beginning to use a graded system to fit the graduated development of the children and lacked experience in choosing appropriate materials for each grade. Every commercial system recommended itself as the answer for children's needs, but the commercial authors of handwriting materials lacked direct contact with children and did not adapt their work to the stages of child development. (p. 30)

Early experiments by Woodworth and McAllister to discover the most natural letter slope for handwriting were prompted by reports from Germany and France that cursive writing might cause curvature of the spine and eyestrain in students (Dougherty, 1917). Woodworth (1899) and McAllister (1900) concluded that the most natural slope (slant) for writing was between five and fifteen degrees from the vertical. Little attention was given to this research. The first Palmer method sloped 38 degrees and modern versions of Palmer method slope 30 degrees from the vertical.

All letter models, used by current publishers of cursive handwriting materials in America, although slightly different, are adapted from the models of Zaner and Palmer with the exception of the italic handwriting programs.

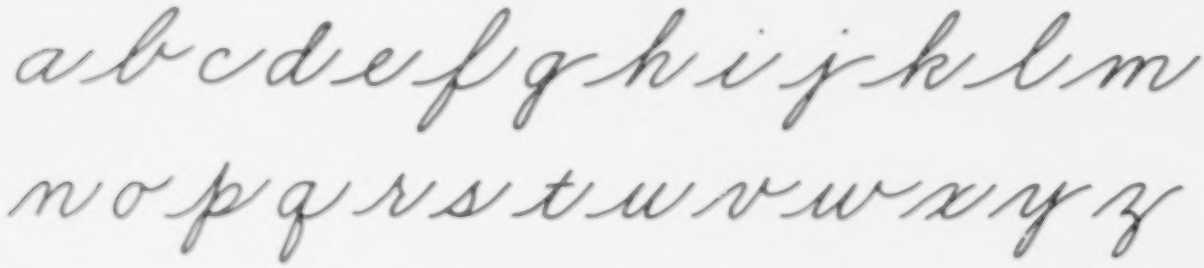


Figure 1. An example of the small letters handwritten by the author based on the Palmer cursive models.

Manuscript Handwriting Style

Manuscript writing can be traced to the late 19th century and the revival of traditional letter models in book making, print and letter design in England. William Morris revived the study, which gained credibility with a broad audience of

educators. One of his associates, a calligrapher named Edward Johnston, published a classic work Writing & Illuminating & Lettering in 1908. Although Johnston published no models for schools, he gave an address at the annual Conference of London Teachers in January, 1913. Writers take varying views as to the content of that lecture, but are in general agreement that, although Johnston was not consulted, a misunderstanding of his recommendations led to the development of a style of writing using circles and vertical lines now referred to as manuscript (Enstrom, 1969; Fairbank, 1977; Hildreth, 1960; Lehman, 1976; Piggott, 1958).

Manuscript was introduced in America from England by Margaret Wise in 1921. In the preface to her book (1924), Wise said:

> Manuscript writing, which has been spreading so rapidly in England during the last few years, is the name given to a simplified form of handwriting which aims at greater legibility, beauty and speed by doing away with the unnecessary joinings of the letters and returning to the plain capitals and miniscules of the Roman alphabet. It is, in effect, a return to the fifteenth century Italian cursive handwriting. (p. xiii)

By 1936, Edith Conard reported that teachers in the Horace Mann School had decided on the best version of manuscript according to their experience. The manuscript agreed upon by the teachers was more rigid and geometric than Wise had intended. Lehman (1976) reports from personal correspondence:

> Although Marjorie Wise effectively launched manuscript handwriting with her manual during her stay in America from 1921-24, she later rejected her work as ill-advised and misused. In her judgement, italic models developed for children by the British calligrapher Alfred Fairbank in 1932 were the best solution. She actively supported

> the italic handwriting movement in England and joined as a member of the first board meeting of the Society of Italic Handwriting in 1952. But her manuscript letter models had spread throughout America with the help of Edith Conard and the support of the credibility generated at Columbia University. (p. 50)

Twenty-five years after the introduction of manuscript, in surveys from 727 schools representing forty-eight states, it was indicated that manuscript writing was being used for initial writing instruction in 84.3% of the schools (Freeman, 1936). The wide adoption of manuscript was attributed to new views concerning the place of writing in the school curriculum and the methods of teaching the skill (Hildreth, 1960).

Originally, teachers of manuscript handwriting intended that the students would continue writing manuscript, with no suggestion that at midpoint in learning a changeover to cursive style writing would be required (Hildreth, 1963; Lehman, 1976). In a summary of the research, Freeman (1936) concluded that manuscript was equal in speed to cursive and superior in legibility. Detailed summaries of the advantages in the use of manuscript writing have since been written (Anderson, 1965; Askov, Otto and Askov, 1970; Gray, 1956; Hildreth, 1960; Jackson, 1971; N.E.A. Research Division, 1951; West, 1950). Regardless of the original intent and the research evidence to support the continued use of manuscript without transition to cursive, by 1946, Polkinghorne found that 66.14% of the sampled schools switched to cursive in grade three or above; and Freeman (1936) found that by grade four only 4.4% of those sampled were employing the manuscript style by the end of the third grade.

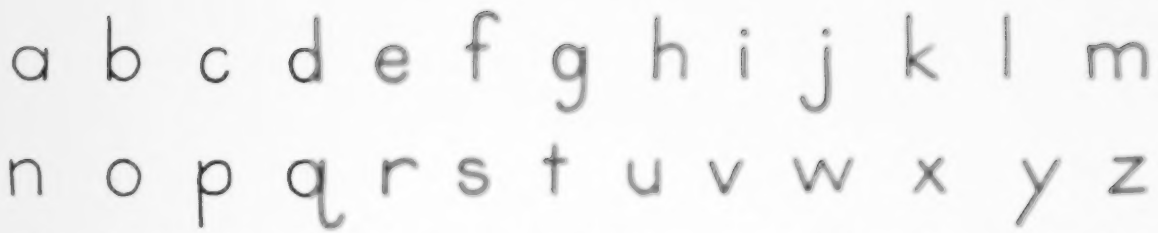


Figure 2. An example of small letters handwritten by the author based on Zaner-Bloser manuscript models.

Concerns have been voiced about teaching children two very different styles of writing--manuscript and cursive. The round, vertical manuscript (Figure 2) is poor preparation for learning the elliptical, slanted cursive (Figure 1). Learning two different forms requires time and the transition interferes with the development of children's ability in written composition (DeHaven, 1979; Fairbank, 1979; Hildreth, 1960; Lehman, 1976; Plattor and Woestehoff, 1967; Robinson, 1980; Templin, 1960; Western, 1977).

Italic Handwriting Style

Margaret Wise introduced italic in 1921. The italic letters she introduced were changed and modified by the teachers and became the current style referred to as manuscript.

According to Fairbank (1979), the teaching of manuscript ignores the lesson taught by Renaissance history, namely that the Roman letter (as the manuscript) is one written with pen-lifts and that its fluent counterpart is italic which evolved from a need for fast writing. He felt that instead of teaching manuscript, that is not designed for fluency and must be abandoned,

it would seem sensible to teach italic from the beginning. Italic print becomes italic cursive with no transition.

In the report on the adoption of italic in the Portland schools the following are listed as the reasons for teaching to italic handwriting:

> 1. It is simple, legible, written easily and rapidly.
> 2. Learning one system of handwriting eliminates a confusing transition from ball and stick manuscript to looped cursive.
> 3. Basic italic letterforms use natural hand movements, suitable for special students, such as those lacking fine motor skills. (Blank, 1983, p. 6)

Italic was originally recommended by Johnston (1908); and even before that Monica Bridges, inspired by the Morris revival of letters, published a book proposing the use of the 16th century italic letter models for the instruction of small children (Lehman, 1976). Marion Richardson produced materials for schools as early as 1928. Alfred Fairbank developed italic models for children in 1932. According to a letter received by Lehman (1976), it was the models of Alfred Fairbank that Marjorie Wise felt should be taught. Wise actively supported the italic handwriting movement in England and rejected her work during her stay in America as ill-advised and misused.

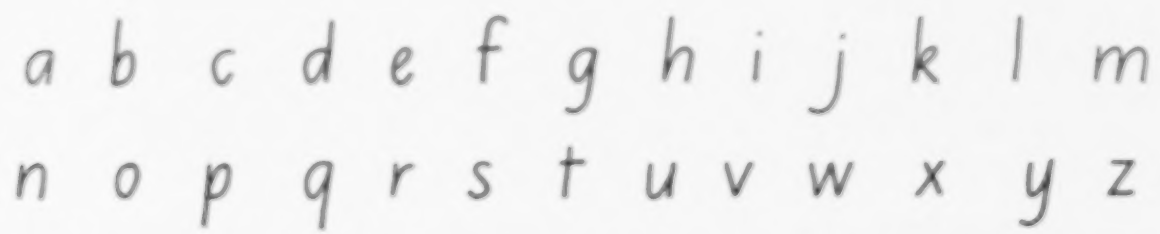


Figure 3. An example of small letters handwritten by the author based on the Duvall italic print models.

Studies have shown that italic is superior to manuscript and/or cursive in both speed and legibility (Berry, 1961; DiSpigno, 1978; Duvall, 1984; Lehman, 1976; Thomson). Piggott (1958) reported that over fifty text-books, sets of copy books, and manuals in which italic was recommended had been published in England between 1950 and 1958. Italic has been recommended by experts in writing and by school administrators (Berry, 1961; Blank, 1983; DiSigno, 1978; Fairbank 1979; Gourdie, 1974; Horn, 1962; Huitt, 1972; Knade, 1983; Lehman, 1976; Reynolds, 1969; Robinson, 1980; Thomson, 1954; Tracy, 1982; Wise, 1924). Writers of current language arts books refer to italic as an alternative to manuscript/cursive (Anderson and Lapp, 1979; DeHaven, 1979; Petty, Petty and Becking, 1981).

D'Nealian Handwriting Style

D'Nealian was developed by Donald N. Thurber and published by Scott Foresman Company in 1978. Although the author considers D'Nealian an adaptation of manuscript/cursive, writers of language arts texts suggest teaching it as an alternative to the traditional manuscript/cursive (DeHaven, 1979; Hennings, 1982; Petty, Petty and Becking, 1981).

The D'Nealian manuscript letter forms (Figure 4) are slightly oval and slanted rather than round and vertical as in the traditional manuscript. Exits, or ending strokes, are added to these manuscript letters. In cursive D'Nealian letter forms, the general characteristics of cursive letters in other writing systems are retained. No research was found to support teaching D'Nealian, but because

it was suggested, it was included in this study.

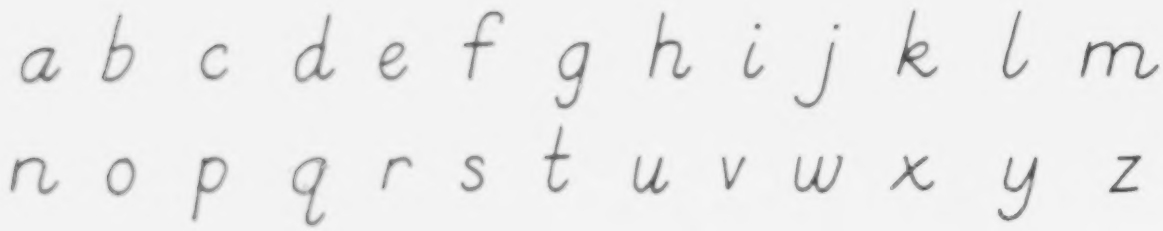


Figure 4. An example of the small letters handwritten by the author based on D'Nealian manuscript models.

Purpose of this Study

The purpose of this study was to establish a process for evaluating the difficulty of different handwritten letter forms. In the study, a criteria for calculating difficulty scores was delineated and four sets of letter forms were evaluated. Using the criteria, small letters were given a score of difficulty. The difficulty of a style of handwriting or program was determined by the sum of the difficulty scores of the letters.

Hand movement, visual memory, and control of movement were considered necessary to produce letter forms, or write. Maturation and move scores were calculated to determine the hand movement difficulty. Beginning and estimation scores were calculated to determine the visual memory difficulty. Retrace and touch scores were calculated to determine the control of movement difficulty.

The form and formation of the letters varies among styles, such as cursive, manuscript, and italic, and among authors of

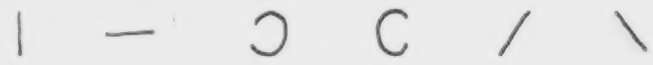
programs, for example, the manuscript of Zaner-Bloser and D'Nealian. The letter forms chosen for this study were: cursive (based on the models of Palmer), manuscript (based on the models of Zaner-Bloser and D'Nealian), and italic (based on the models of Duvall). Because small letters are used for over 80% of all writing, only the small letters were analyzed.

Criteria for Calculating a Difficulty Score

HAND MOVEMENT

Handwriting is lines and shapes left by movement of the hand. The movements that leave the lines and shapes have varying degrees of difficulty due to maturation and quantity. Maturation and move scores were calculated to determine the hand movement difficulty of each letter in the four styles.

Maturation scoring was based on the Beery Development Test of Visual-Motor Integration. Beery summarized research telling which strokes appear in children's scribbles as they mature from age 2 to 6. A maturation score was assigned to each letter using the values 1-6 as determined by Beery to be developmentally least to more difficult. Using this scoring procedure, the capital letter M in the example would receive a maturation difficulty score = 13.



1 2 3 4 5 6

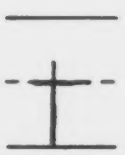
Move score was determined by the up, down, and over movement of the hand. The difficulty of producing a letter is increased with each time the hand must change direction. Using this scoring procedure, the c in the example would receive a move difficulty score = 3.

1 1 1 1 1

VISUAL MEMORY

The need for visual memory increases the difficulty of handwriting. The more frequently the formation of the letters requires the retention of a visual image, the more difficult the letters are to write. Beginning and estimation scores were calculated to determine the visual memory difficultly for each letter in the four styles.

Beginning score was calculated for each stroke that did not begin on a line. The writer must visualize where to begin if the stroke does not begin on a line. Small t in the example would receive a beginning difficulty score = 1.



Estimation score was calculated when the formation of the letter required the writer to lift the pencil and determine where in "outer space" to begin the second stroke, as well as,

in what direction to move. Each lift/reposition received a weight of two. (The dot on i and j was ignored in all styles.) Capital K in the example has a estimation difficulty score = 2.

CONTROL OF MOVEMENT

Control of the hand to retrace or touch add to the difficulty of handwriting. Retrace and touch scores were calculated to determine the control difficulty for each letter in the four styles.

Retrace score was calculated when the formation of the letter required the writer to stay "on the same track" or retrace a previous line. Small m in the example would receive a retrace difficulty score = 2.

Touch score was determined by the meeting of two lines. When one line must touch another in the formation of a letter, the chance of making an error increases. (The cross on small t was ignored in all styles.) The capital A in the example would receive a touch difficulty score = 3.

Results of this Study

Small letters in four handwriting programs were analyzed: cursive based on Palmer cursive models, manuscript based on Zaner-Bloser manuscript and D'Nealian manuscript models, and

italic based on Duvall italic print models. Difficulty scores were assigned by analyzing each letter for maturation, move, beginning, estimation, retrace, and touch (Appendix). The total of the difficulty scores for each of the small letters for the four styles evaluated are shown on the chart below. Duvall italic print models received the lowest difficulty score and Palmer cursive received the highest difficulty score. The scores for Zaner-Bloser and D'Nealain manuscript were higher than the score for Duvall italic print but less than the score for Palmer cursive.

DIFFICULTY SCORES OF THE FOUR STYLES EVALUATED

	HAND MOVEMENT		VISUAL MEMORY		CONTROL		
STYLE	MATURATION	MOVE	BEGINNING	ESTIMATION	RETRACE	TOUCH	TOTAL
Italic (Duvall)	165	95	2	8	13	11	294
Manuscript (Zaner-B.)	172	100	26	42	0	26	355
Manuscript (D'Nealian)	197	133	5	6	16	10	367
Cursive (Palmer)	331	192	0	4	26	9	562

Scores reported for maturation and move reflect the degree of hand movement difficulty for each of the four styles. The hand movement difficulty score for Palmer cursive was over twice as high as the hand movement difficulty score of Duvall italic print. The scores for hand movement difficulty from lowest to highest were:

	MATURATION	MOVE	TOTAL
Duvall italic print	165	95	260
Zaner-Bloser manuscript	172	100	272
D'Nealian manuscript	197	133	330
Palmer cursive	331	192	523

Scores reported for beginning and estimation reflect the degree of visual memory difficulty for each of the four styles. Zaner-Blower manuscript had an excessively high score in comparison to the other styles for visual memory. The scores for visual memory difficulty from lowest to highest were:

	BEGINNING	ESTIMATION	TOTAL
Palmer cursive	0	4	4
Duvall italic print	2	8	10
D'Nealian manuscript	5	6	11
Zaner-Bloser manuscript	26	42	68

Scores reported for retrace and touch reflect the degree of control difficulty for each of the four styles. The scores for control difficulty from lowest to highest were:

	RETRACE	TOUCH	TOTAL
Duvall italic print	13	11	24
Zaner-Bloser manuscript	0	26	26
D'Nealian manuscript	16	10	26
Palmer cursive	26	9	35

Conclusions

Handwriting research has attempted to establish which handwriting style was the most legible and the fastest to write. No attention has been given to determining if the letter forms vary in difficulty. This study has established a process for evaluating the difficulty of letter forms and criteria for calcu-

lating difficulty scores.

Palmer cursive is based on copperplate engraving, a printing process. Writers have contended that cursive writing has outlived its usefulness. Cursive was the most difficult style to write according the results of this study. The high maturation score of cursive would indicate that cursive is not a suitable style for beginning writers. The high maturation score of cursive might indicate that immature writers would find it difficult to produce the cursive letters forms. The high hand movement difficulty scores would cause one to wonder if only the most adept are able to reproduce the letter forms.

The high visual memory score of Zaner-Bloser manuscript could indicate that students with poor visual memory would find it difficult to write the Zaner-Bloser manuscript letter forms. The high visual memory scores are caused by the many pencil lifts necessary to produce the letters.

D'Nealian manuscript, although not as difficult as cursive, was slightly more difficult than Zaner-Bloser manuscript.

Italic is the easiest style to write according to reports in the literature. The scores of the styles evaluated in this study support that italic print letter forms were the least difficult to write. From the results of this study and from the research evidence, italic is recommended as a style to teach elementary students.

Italic offers the best alternative to manuscript with a transition to cursive. In addition to being easier to write,

there is no transition to interrupt the learning when italic is taught. The change from italic print to an italic cursive writing is the natural joining of the same letter forms as speed increases.

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APPENDIX

DIFFICULTY SCORES FOR PALMER CURSIVE

	HAND MOVEMENT		VISUAL MEMORY		CONTROL OF MOVEMENT		
LETTER	MATURATION	MOVE	BEGINNING	ESTIMATION	RETRACE	TOUCH	TOTAL
a	8	6	0	0	1	1	16
b	12	7	0	0	1	0	20
c	9	5	0	0	1	0	15
d	13	8	0	0	0	1	22
e	8	5	0	0	0	0	13
f	21	9	0	0	0	1	31
g	12	7	0	0	1	1	21
h	20	9	0	0	1	0	30
i	8	4	0	0	1	0	13
j	12	5	0	0	1	0	18
k	20	10	0	0	1	0	31
l	8	6	0	0	0	0	14
m	13	11	0	0	2	0	26
n	10	8	0	0	1	0	19
o	8	6	0	0	1	1	16
p	19	10	0	0	2	1	32
q	17	9	0	0	1	2	29
r	12	7	0	0	1	0	20
s	11	7	0	0	2	1	21
t	15	5	0	2	1	0	23
u	12	7	0	0	2	0	21
v	11	7	0	0	1	0	19
w	16	9	0	0	3	0	28
x	12	7	0	2	0	0	21
y	15	10	0	0	1	0	26
z	9	8	0	0	0	0	17
TOTAL	331	192	0	4	26	9	562

DIFFICULTY SCORES FOR ZANER-BLOSER MANUSCRIPT

	HAND MOVEMENT		VISUAL MEMORY		CONTROL OF MOVEMENT		
LETTER	MATURATION	MOVE	BEGINNING	ESTIMATION	RETRACE	TOUCH	TOTAL
a	5	5	1	2	0	2	15
b	4	5	1	2	0	2	14
c	4	4	1	0	0	0	9
d	5	5	1	2	0	2	15
e	6	5	1	0	0	1	13
f	7	4	0	2	0	0	13
g	8	7	1	2	0	2	20
h	4	4	1	2	0	1	12
i	1	1	0	0	0	0	2
j	4	3	0	0	0	0	7
k	12	3	0	2	0	1	18
l	1	1	0	0	0	0	2
m	7	7	2	4	0	2	22
n	4	4	1	2	0	1	12
o	4	4	1	0	0	1	10
p	4	5	1	2	0	2	14
q	9	7	1	2	0	2	21
r	4	3	1	2	0	1	11
s	7	4	0	0	0	0	11
t	3	2	1	2	0	0	8
u	5	4	0	2	0	1	12
v	11	2	0	2	0	1	16
w	22	4	0	6	0	3	35
x	11	2	0	2	0	0	15
y	11	2	0	2	0	1	16
z	9	3	0	0	0	0	12
TOTAL	172	100	26	42	0	26	355

DIFFICULTY SCORES FOR DUVALL ITALIC

	HAND MOVEMENT		VISUAL MEMORY		CONTROL OF MOVEMENT		
LETTER	MATURATION	MOVE	BEGINNING	ESTIMATION	RETRACE	TOUCH	TOTAL
a	5	4	0	0	1	1	11
b	4	5	0	0	1	1	11
c	4	3	0	0	0	0	7
d	5	4	0	2	1	2	14
e	8	4	1	0	0	1	14
f	7	3	0	2	0	0	12
g	8	5	0	0	1	1	15
h	4	4	0	0	1	0	9
i	1	1	0	0	0	0	2
j	4	2	0	0	0	0	6
k	10	3	0	0	0	1	14
l	1	1	0	0	0	0	2
m	7	9	0	0	2	0	18
n	4	5	0	0	1	0	10
o	4	4	0	0	0	1	9
p	4	5	0	0	1	2	12
q	5	4	0	0	1	1	11
r	4	3	0	0	1	0	8
s	7	4	0	0	0	0	11
t	3	2	1	2	0	0	8
u	5	5	0	0	1	0	11
v	11	2	0	0	0	0	13
w	22	4	0	0	0	0	26
x	11	2	0	2	0	0	15
y	8	2	0	0	1	0	11
z	9	3	0	0	0	0	12
TOTAL	165	95	2	8	13	11	294

DIFFICULTY SCORES FOR D'NEALIAN MANUSCRIPT

	HAND MOVEMENT		VISUAL MEMORY		CONTROL OF MOVEMENT		
LETTER	MATURATION	MOVE	BEGINNING	ESTIMATION	RETRACE	TOUCH	TOTAL
a	9	6	0	0	1	1	17
b	5	4	0	0	0	1	10
c	4	4	1	0	0	0	9
d	9	7	0	0	2	2	20
e	8	4	1	0	0	1	14
f	7	4	1	2	0	0	14
g	8	6	0	0	1	1	16
h	8	6	0	0	1	0	15
i	5	3	0	0	0	0	8
j	4	3	0	0	0	0	7
k	8	5	0	0	1	1	15
l	5	3	0	0	0	0	8
m	11	11	0	0	2	0	24
n	8	7	0	0	1	0	16
o	4	4	1	0	0	1	10
p	4	6	0	0	2	1	13
q	9	6	0	0	1	1	17
r	4	3	0	0	1	0	8
s	7	6	1	0	0	0	14
t	7	4	0	2	0	0	13
u	9	7	0	0	1	0	17
v	11	2	0	0	0	0	13
w	11	8	0	0	1	0	20
x	11	4	0	2	0	0	17
y	12	7	0	0	1	0	20
z	9	3	0	0	0	0	12
TOTAL	197	133	5	6	16	10	367